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SITKA SPRUCE

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Sitka spruce, the largest of our native spruces, grows in a narrow strip along the Pacific coast from northwestern California to Kodiak Island, Alaska. The major volume of Sitka spruce commercial forest stands is in southeastern Alaska. The wood is uniformly textured and has a high strength/weight ratio. The peak lumber production periods for Sitka spruce were during World War I and World War II. Present uses are mainly for lumber and pulpwood.

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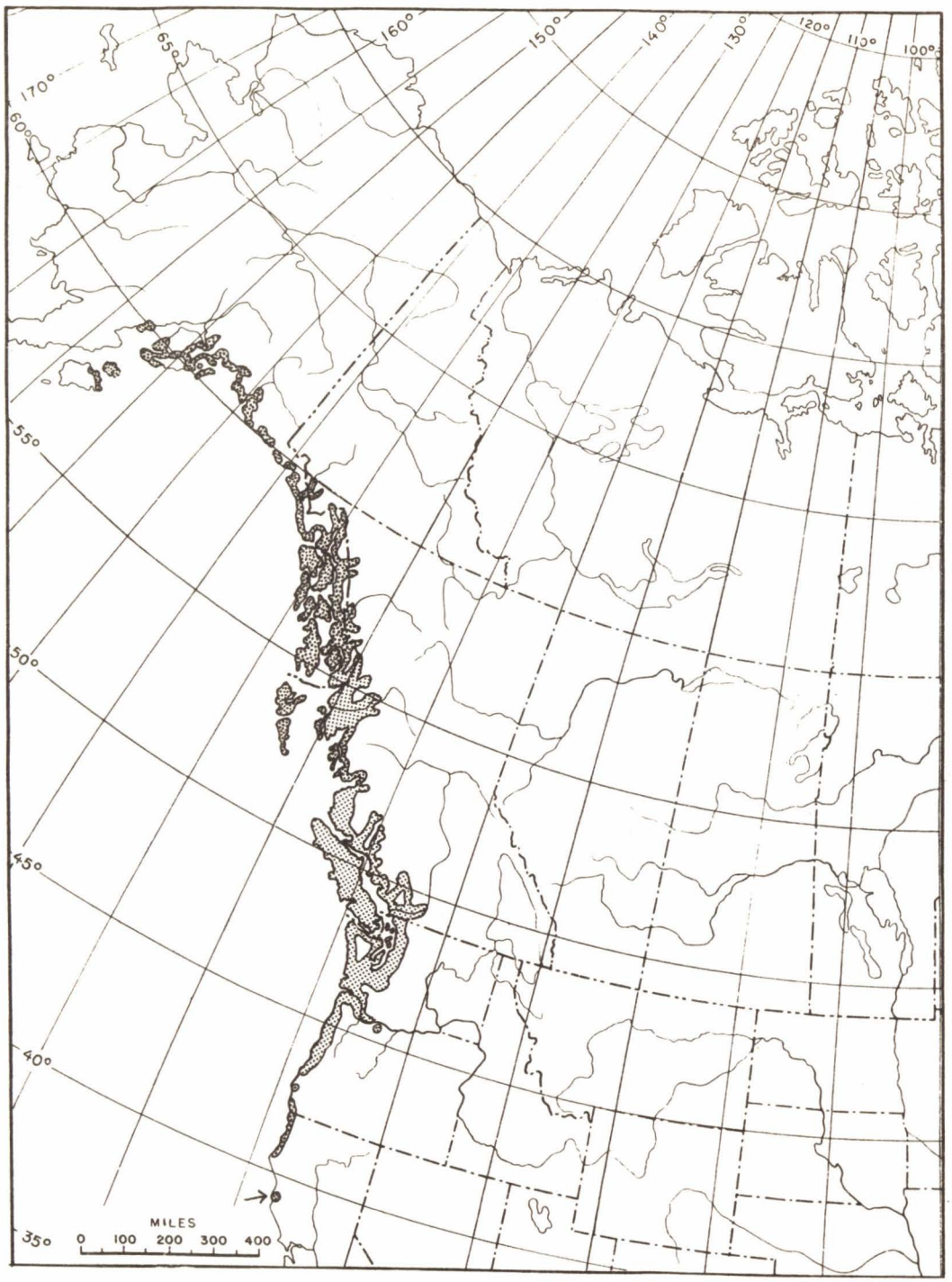

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Figure 1. Natural range of Sitka spruce, *Picea sitchensis*.

SITKA SPRUCE

(*Picea sitchensis* (Bong.) Carr.)

Richard O. Woodfin, Jr.[1]

DISTRIBUTION

Sitka spruce has a 1,800-mile range along the Pacific coast of North America—from northwestern California to Kodiak Island, Alaska. Along this range, two climatic conditions predominate: high precipitation and prolonged cloudiness, both common to the coastal fog belt. The range varies in width from a few miles in California, where it is restricted to the mouths of streams and low valleys facing the ocean, to about 130 miles in Alaska. The range in Alaska consists of a narrow strip along the mainland coast, a band around the many islands, and inland areas in the valleys. In Oregon and Washington, the maximum range inland from the coastline is about 30 miles, except where it extends many miles up coastal rivers (fig. 1).

Although Sitka spruce occassionally forms pure stands, it generally grows in mixture with western hemlock, Douglas-fir, Pacific silver fir, red alder, vine maple, western redcedar, redwood in northern California, and lodgepole pine on coastal sand dunes within the Sitka spruce range.

DESCRIPTION AND GROWTH

Sitka spruce is a vigorous, fast-growing tree usually occupying a dominant position in the forest canopy. It is an impressive, tall, straight tree with an evenly tapering trunk. Mature trees usually develop a much-enlarged, swollen, and buttressed base (fig. 2) and an open, conical crown.

Sitka spruce may live 700 to 800 years, attaining a diameter at breast height (d.b.h.) in excess of 10 feet. Mature trees in Washington and Oregon commonly live 400 to 450 years, measuring 4 to 6 feet d.b.h. and more than 200 feet in height. The largest trunk diameter reported in those States was 16.4 feet, and the tallest height, 286 feet. Mature trees on the Tongass National Forest in Alaska average 160 feet in height and 3 to 5 feet d.b.h. The largest known Sitka spruce in Alaska has a trunk diameter of 14.5 feet at a point 6 feet above

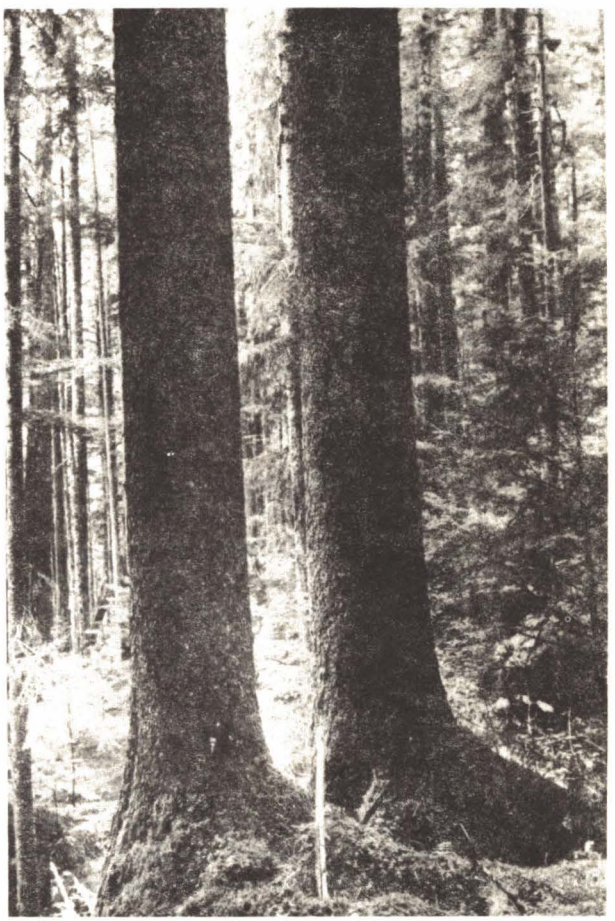

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Figure 2.—Mature Sitka spruce are characterized by a buttressed base and straight, evenly tapered trunk.

[1] Wood technologist, Pacific Northwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture.

NOTE: This publication supersedes unnumbered publication *Sitka Spruce*, issued 1945.

the ground. More than 50 percent of the Sitka spruce sawtimber volume is in trees 31 inches or larger in diameter.

Sitka spruce cones are usually 2 to 3½-inches long, cylindrical, narrow, and light orange brown (fig. 3). Scales at maturity are thin, rounded, papery, and irregularly toothed. Needles are ⅝ to 1 inch long, sharp-pointed, flattened, and thin; they have two whitish bands on each side and stand out on all sides of a twig. The top of the needle is slightly keeled or angled, and the bottom is rounded or slightly keeled. The outer bark is dark purplish and brown, thin, scaly, and relatively smooth; the inner bark is whitish with brown spots.

The tree produces a good seed crop only every 3 to 4 years, but few of those crop years can be considered failures. Seedling survival is exceptional because moisture is almost always adequate, and seedlings are tolerant of dense shade. After the seedling stage, however, the trees must have overhead light for rapid growth.

COMMON NAMES

Sitka spruce (*Picea sitchensis*) is named for Sitka Island (now known as Baranof Island) in southwestern Alaska where the species was discovered and named in 1832. Sitka spruce is also known as coast spruce, tideland spruce, and yellow spruce.

SUPPLY

The volume of Sitka spruce sawtimber on commercial forest land of the United States is estimated at 76,989 million board-feet. Alaska contains 87.7 percent of this volume; Washington, 4.2 percent; Oregon, 7.9 percent; and California, 0.2 percent.

PRODUCTION

Annual production of Sitka spruce lumber steadily increased to 165 million board-feet by 1899. During World War I, production reached the alltime maximum of 508 million board-feet because of construction demand of the airplane industry. After the war, production declined to less than 80 million board-feet until World War II, when it exceeded 400 million board-feet. Since World War II, production has been between 125 million and 185 million board-feet. It was 183 million board-feet in 1950 and 139 million board-feet in 1961.

Each State's proportion of lumber production volume has varied during the last 100 years. California led in production from 1869 to 1879. Between 1879 and 1950, Washington generally led in production, with California contributing only a small proportion of the total amount. Since 1950, production in Alaska, Oregon, and Washington has fluctuated, with no one State consistently producing a major portion of the total volume.

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Figure 3.—Sitka spruce showing cones, foliage, and thickness of bark (as indicated by the chopped out square).

The southeastern Alaska sawmills cutting Sitka spruce produce a small volume of standard lumber items for local markets. Most of the logs, however, are cut into cants (squared-off logs) of various export grades and are shipped to Japan. Fifty-seven percent of Alaska's total lumber production went to Japan in 1961. This volume continues to increase, and Sitka spruce accounts for most of it.

Only a small volume of Sitka spruce is exported from the Pacific Northwest. A sample of log exports in the fourth quarter of 1964 from seven principal ports in western Washington and western Oregon showed that only slightly more than 1 percent of log volume exported to Japan was Sitka spruce.

The consumption of Sitka spruce pulpwood in Alaska was estimated at 296,000 cords in 1966. Approximately 27 percent of the log volume in Alaska in 1961 was used as pulpwood.

CHARACTERISTICS AND PROPERTIES

The sapwood of Sitka spruce is creamy white to light yellow, and the heartwood is pinkish yellow to brown. The sapwood shades gradually into the heartwood; in mature trees it may be 3 to 6 inches wide and even wider in young trees.

The wood has fine, uniform texture, generally straight grain, no distinct taste or odor, and very few resin ducts. The annual rings are distinct, with a band

of lighter colored springwood shading gradually into a narrower band of darker summerwood.

Sitka spruce is classed as moderate in weight, stiffness, hardness, resistance to shock, shrinkage, and bending and compressive strength. Although western hemlock and ponderosa pine are also woods of moderate strength properties, Sitka spruce ranks higher in strength on a weight basis. Sitka spruce's availability in large, clear, straight-grained pieces and its high strength/weight ratio accounted for its early demand as an aircraft wood and its present use as ladder stock.

The wood can be worked easily and is not difficult to kiln dry. Sitka spruce, like birch, maple, and the hemlocks, ranks intermediate in resistance to decay. Thin panels of slow-growth Sitka spruce are highly resonant, making them desirable for piano sounding boards.

Sitka spruce pulpwood is sought because of its long, strong fibers and the ease with which it can be pulped. It is readily reduced by the sulfite process to yield a strong pulp. Its texture is not quite as fine as that of white spruce (*Picea glauca*). However, it does bleach easily to an excellent white, which makes it suitable for the manufacture of newspaper, wrapping, book, high-grade printing, and bond papers. It is also readily reduced by the sulfate process to yield a strong pulp suitable for high-grade kraft wrapping papers and fiberboards. When made into pulp by the groundwood (mechanical) process, it yields a product of strength suitable for all groundwood uses. Sitka spruce pulp is also suitable for high-grade chemical pulps for rayon and plastics.

PRINCIPAL USES

A broad range of products have been manufactured from Sitka spruce; these include siding, food containers, cooperage, venetian blinds, boat construction items (especially masts, spars, and oars), door cuttings, cabinets, scaffold planking, and aircraft items.

Major uses are now lumber and pulpwood, especially in Alaska, where more than 88 percent of the volume of the commercial Sitka spruce in the United States grows.

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